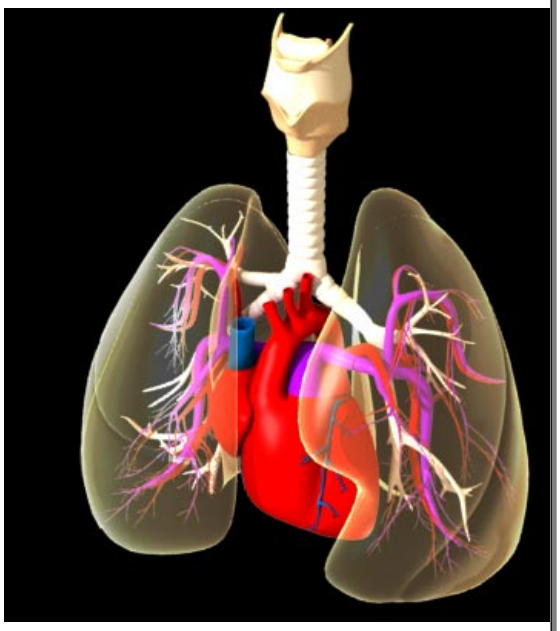
The Respiratory System



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Learning Objectives:

- Investigate the structures and mechanics of respiratory system.
- Design and carry out an experiment to investigate blood pressure, respiratory function or cardiac output under various conditions.
- Describe disorders linked to the circulatory system and/or the respiratory system and their effect on the homeostasis of the system and the organism as a whole.

When you breathe, you inspire. When you do not breathe, you expire!

Oct 30-8:22 PM

Respiration

- internal respiratory surface connected to the air by means of internal passageways

- all lung systems have 3 basic elements
  1) lungs with a moist respiratory surface
  2) some means to forcibly bring air in contact with the lung surface
  3) circulatory system to carry gases about the body

- Breathing can be divided into
  - inspiration - taking air in
  - expiration - breathing air out

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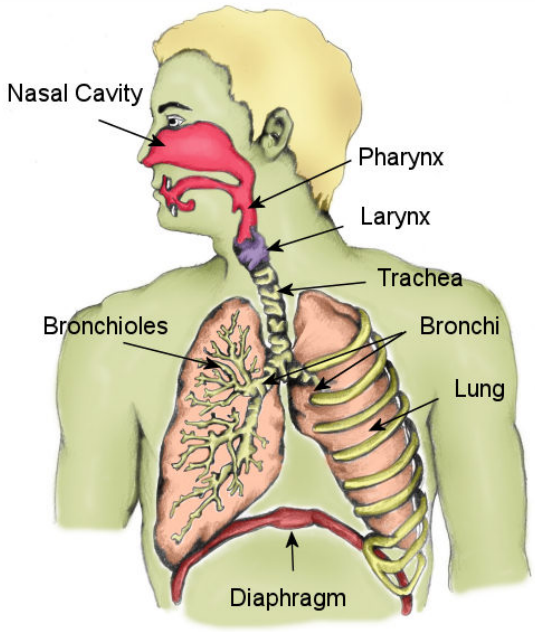
Respiratory System



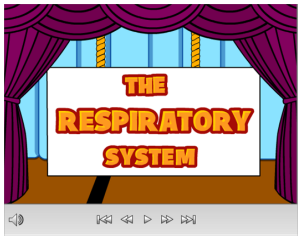


Diagram and Videos

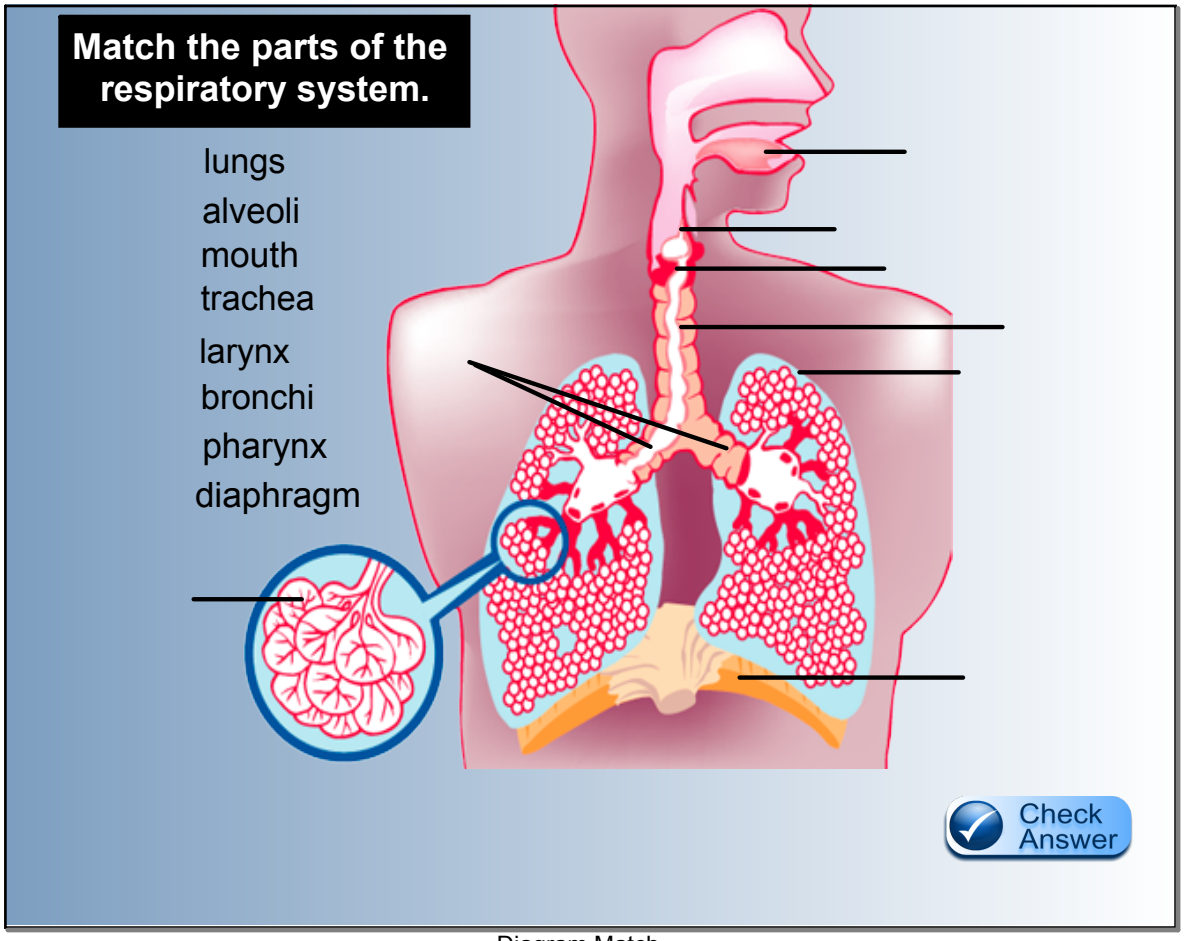


Diagram Match

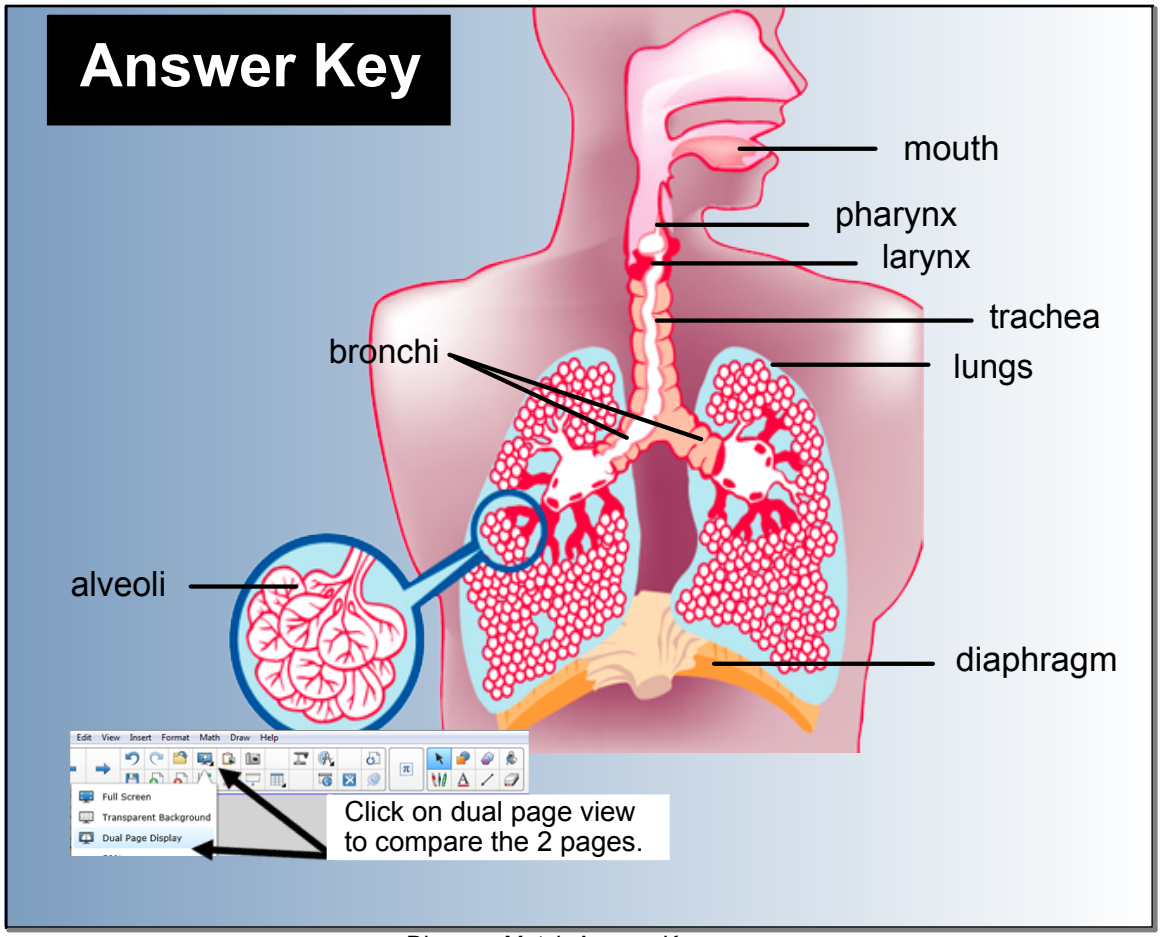


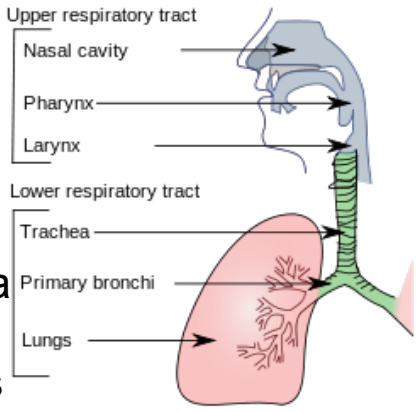
Diagram Match Answer Key

Airs Pathway - The Upper Respiratory Tract

- Air enters and travels through the nasal passage (sometimes the mouth instead)

- Air then travels down the pharynx (connects the mouth and nasal cavity to the larynx and esophagus)

- The glottis is the opening of the trachea (passageway that conducts air to the lungs) and is protected by the epiglottis



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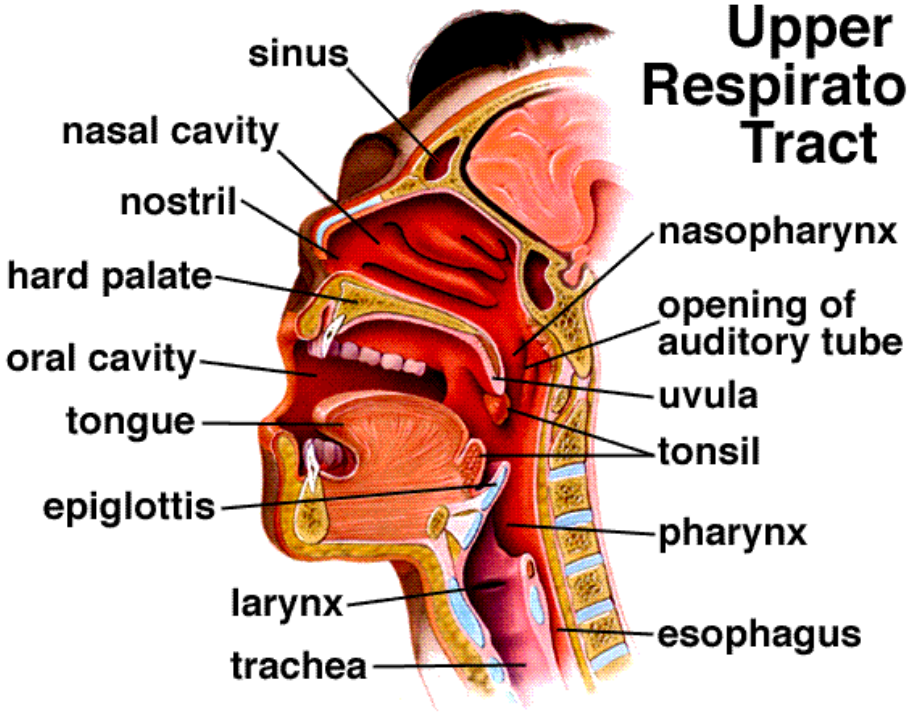

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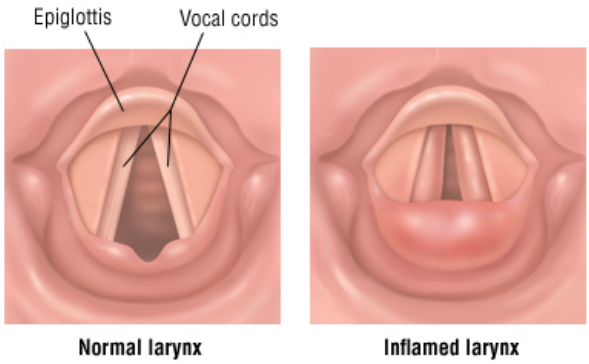
- The Larynx (voice box) houses the vocal cords. When you breath normally there is a gap between the cords and when you prepare to speak muscles around the larynx contract bringing the cords closer together.

- The vibration of the cords as the air passes through them creates sound.

Laryngitis



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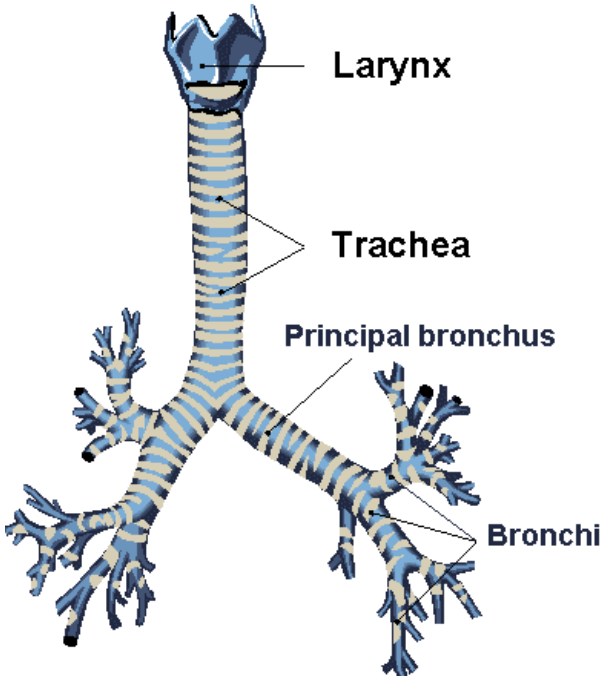
- the trachea is supported by semicircular cartilage rings that prevent the trachea from collapsing.



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Airs Pathway - The Lower Respiratory Tract

- At about armpit level the trachea splits into two smaller passageways called **bronchi** (singular = bronchus)

- One bronchus enters each lung and then subdivides many times to produce a network of tubes called bronchioles

- each bronchioles ends in a grape-like cluster of tiny sacs called alveoli (singular = alveolus). The walls of the alveoli are only one cell thick

- Gas exchange occurs in the alveoli. Most exchange occurs through simple diffusion however about 30% of oxygen exchange occurs using facilitated diffusion

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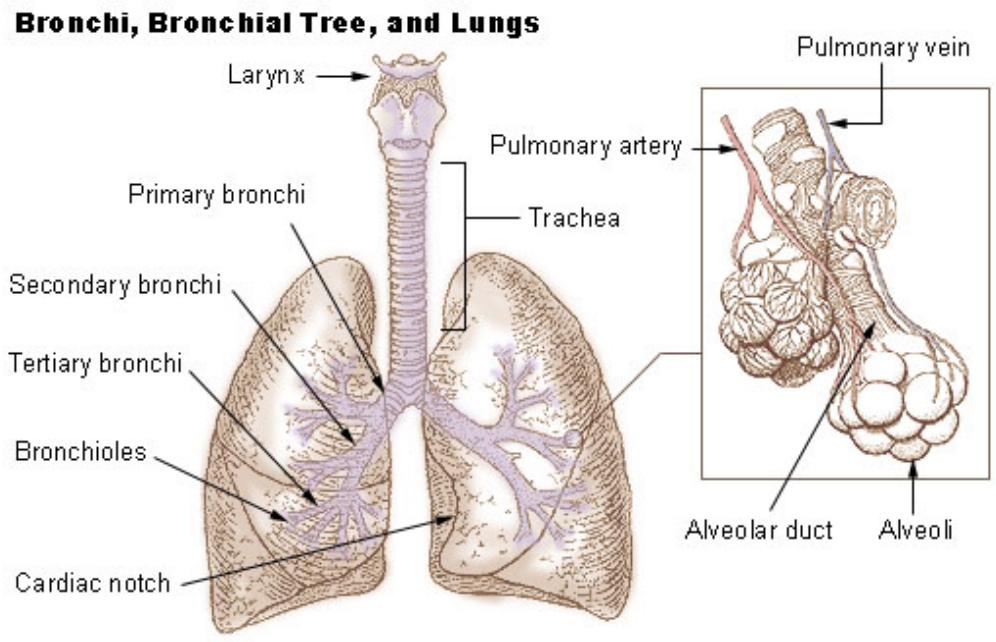

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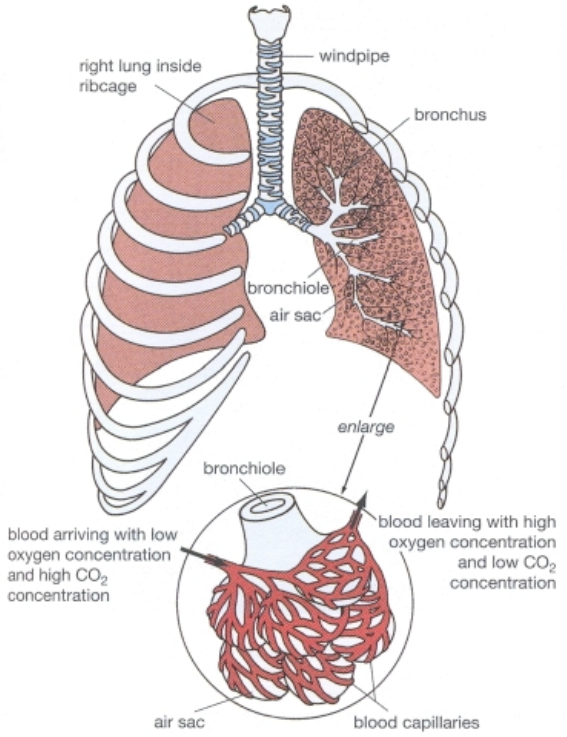

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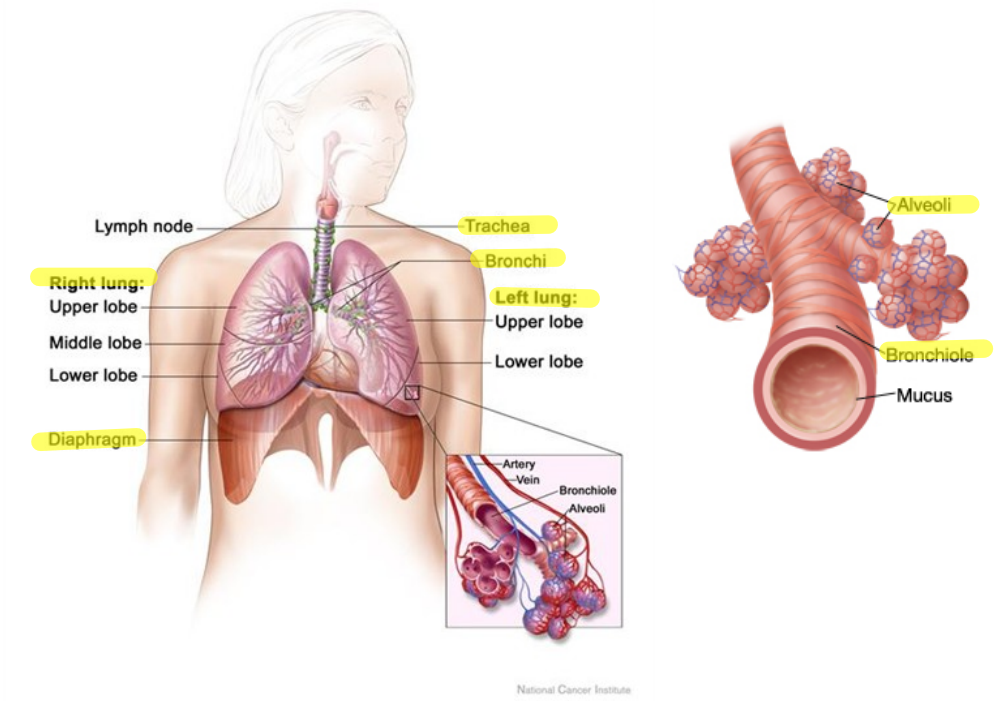

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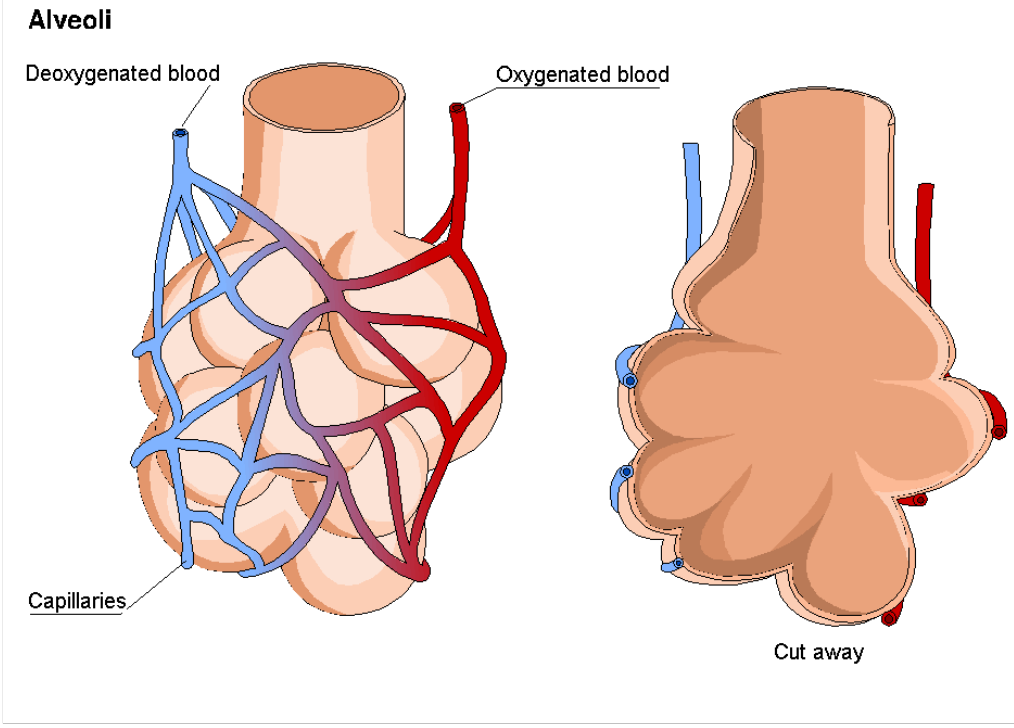

Alveoli

The Lungs

- Each lung is divided into lobes
  - right = 3 lobes
  - left = 2 lobes (to accommodate the heart)

- Each lobe can be subdivided into lobules each with its own bronchiole

- The lungs are enveloped in layers of tissue called **pleura**
  - contains the lungs while still allowing them to expand and contract

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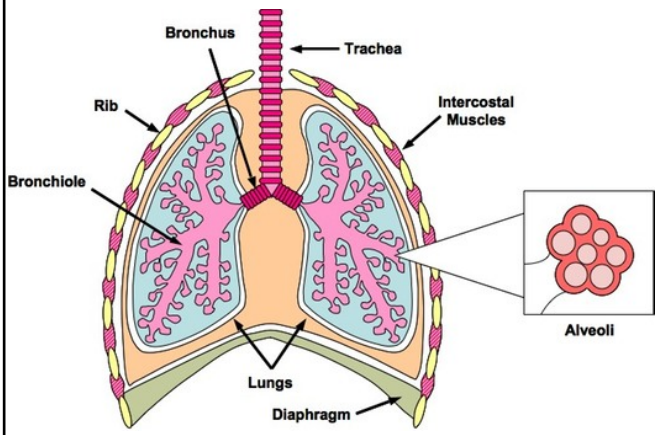
The Mechanics of Breathing

- relies on the principle that air will flow from a region of higher pressure to a region of lower pressure

- two structures control the air pressure inside our lungs:



1) **intercostal muscles** - associated with the ventral surface of the rib cage

2) **diaphragm** - muscle layer that separates the region of the lungs (thoracic cavity) from the region of the stomach and the liver (abdominal cavity)

Nov 21-9:48 PM

Breathing

- intercostal muscles and diaphragm work together

- Inhalation

- intercostal muscles and the diaphragm contract (muscles expand the rib cage while diaphragm moves down in the thoracic cavity) increasing the volume of the cavity and decreasing the air pressure.
- the lungs expand causing air to enter the lungs to even out the low pressure (movement from high to low)

- Exhalation

- diaphragm and external intercostal muscles relax causing the rib cage to move back to original position creating a higher pressure in the lungs
- lungs shrink forcing air out moving from high to low again

Nov 21-10:08 PM

Constituent	Inhaled Air	Exhaled Air
Oxygen	20.9%	16%
Carbon dioxide	0.03%	4.0%
Water vapour	Variable	Variable but more than in inhaled air
Nitrogen	78.1%	78.1%
Noble gases	0.94%	0.94%

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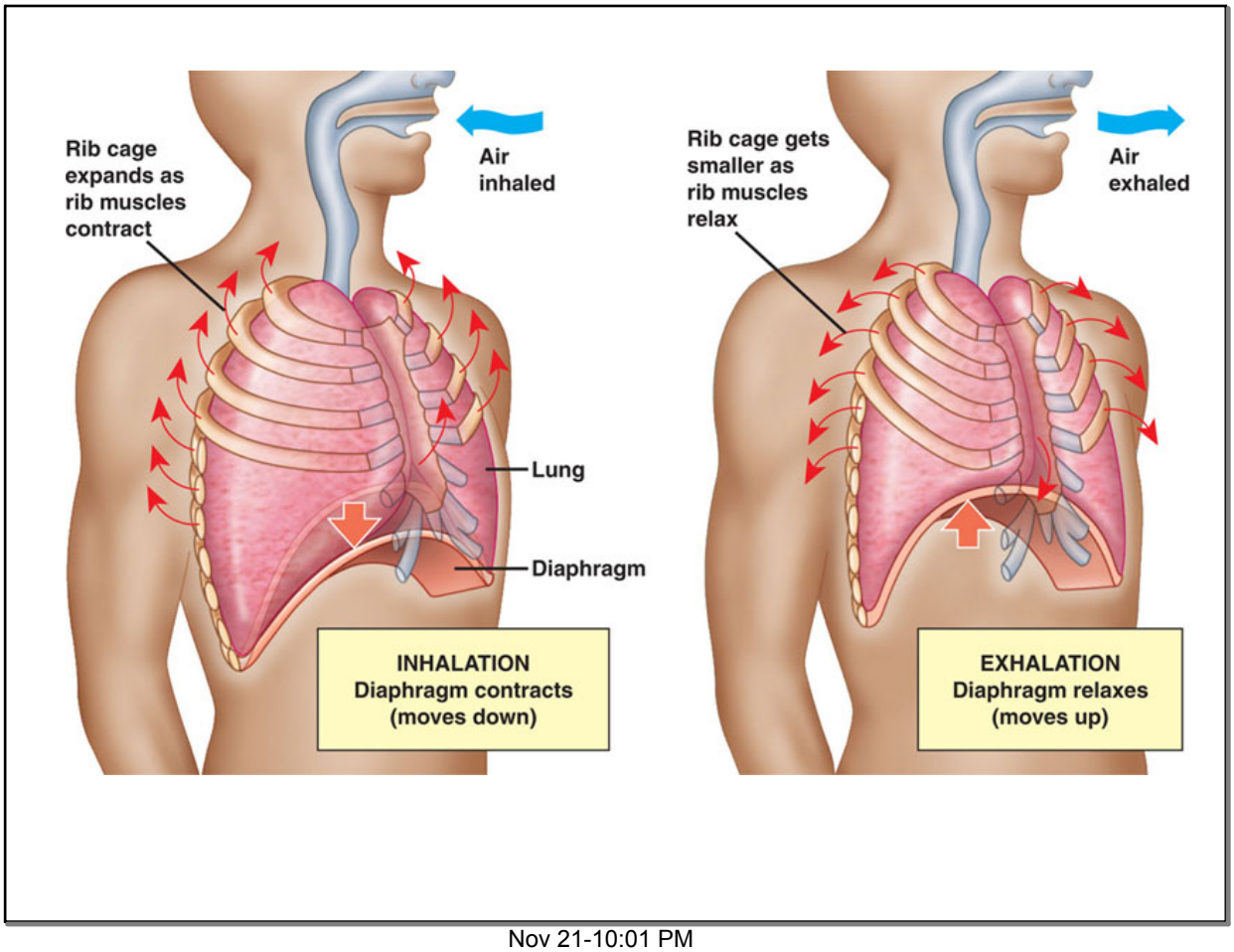

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Experiment: Lung Model

Experiment Question & Hypothesis

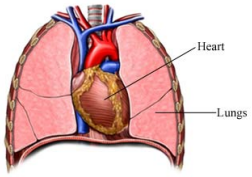
Experiment: Lung Model

Experiment

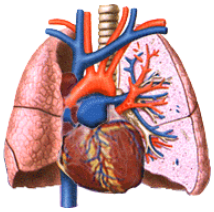
Experiment: Lung Model

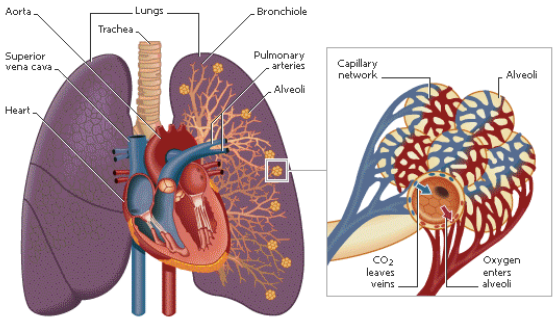
Experiment Observation & Conclusion

How does the heart fit in?



Air goes from our lungs, through the blood stream, and into our heart.





Warning! Possible gross picture ahead!

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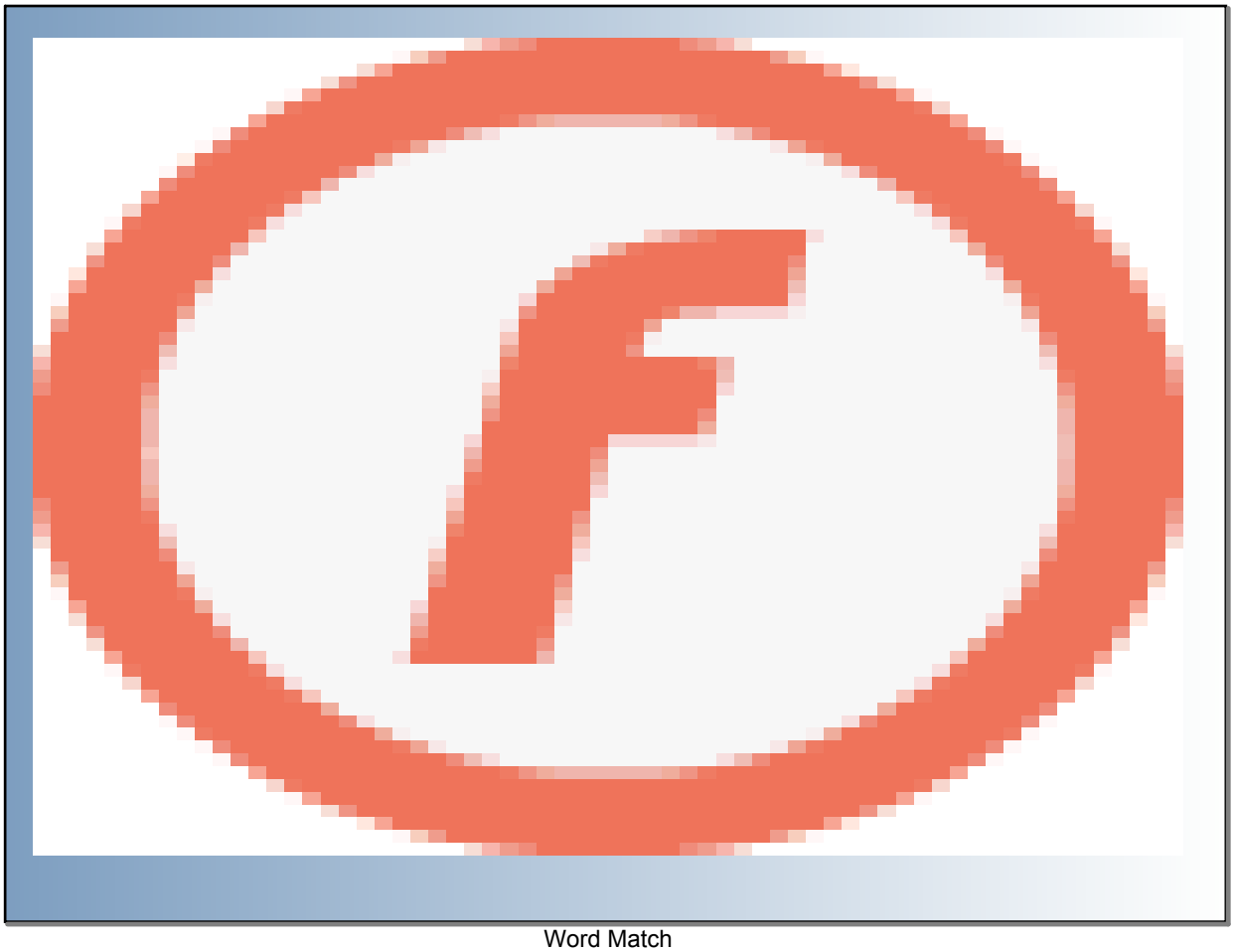
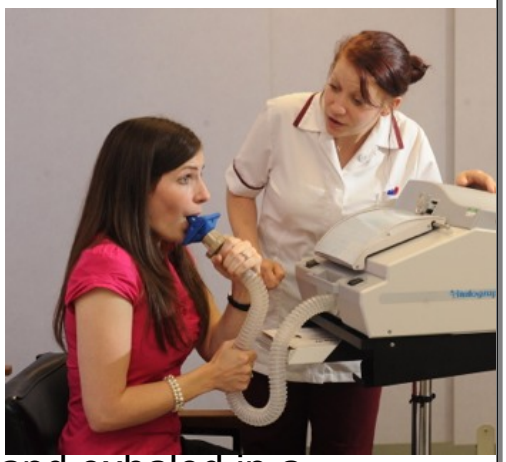


Word Match

Lung Capacity



- under normal conditions your regular breathing does not use up the full capacity of your lungs however needs can increase in certain circumstances ex. exercise

- can be measured with a spirometer

Tidal Volume - volume of air inhaled and exhaled in a normal breathing movement

Inspiratory Reserve Volume - additional volume of air that can be taken in, beyond regular inhalation

Nov 21-10:25 PM

Expiratory Reserve Volume - additional volume of air that can be forced out, beyond regular inhalation

Vital Capacity - total volume of gas that can be moved in or out of the lungs
- it can be calculated as tidal volume + inspiratory reserve volume + expiratory reserve volume

Residual Volume - amount of gas that remains in the lungs and the passageways of the respiratory system after a full exhalation
- if it was to be removed the lung would collapse

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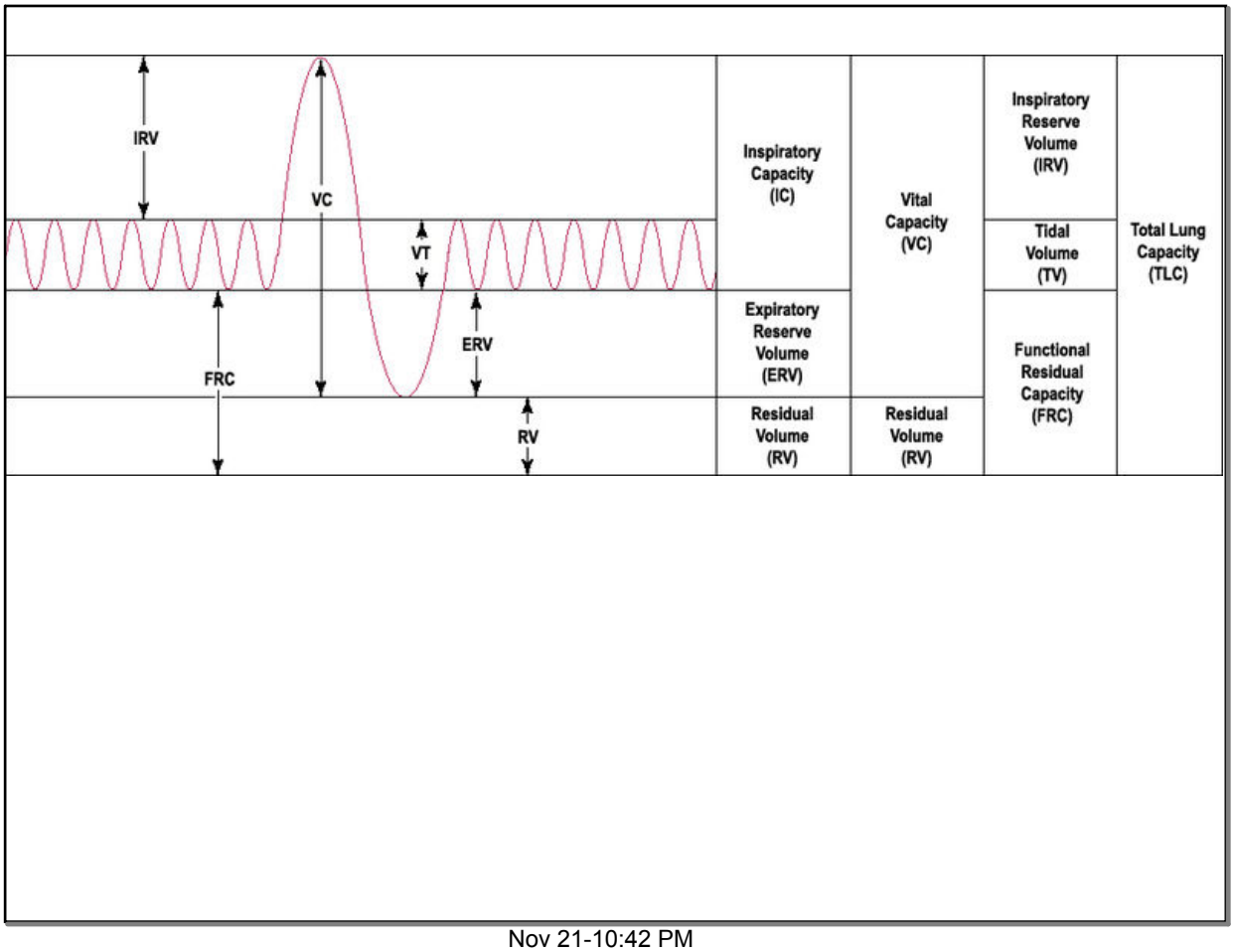

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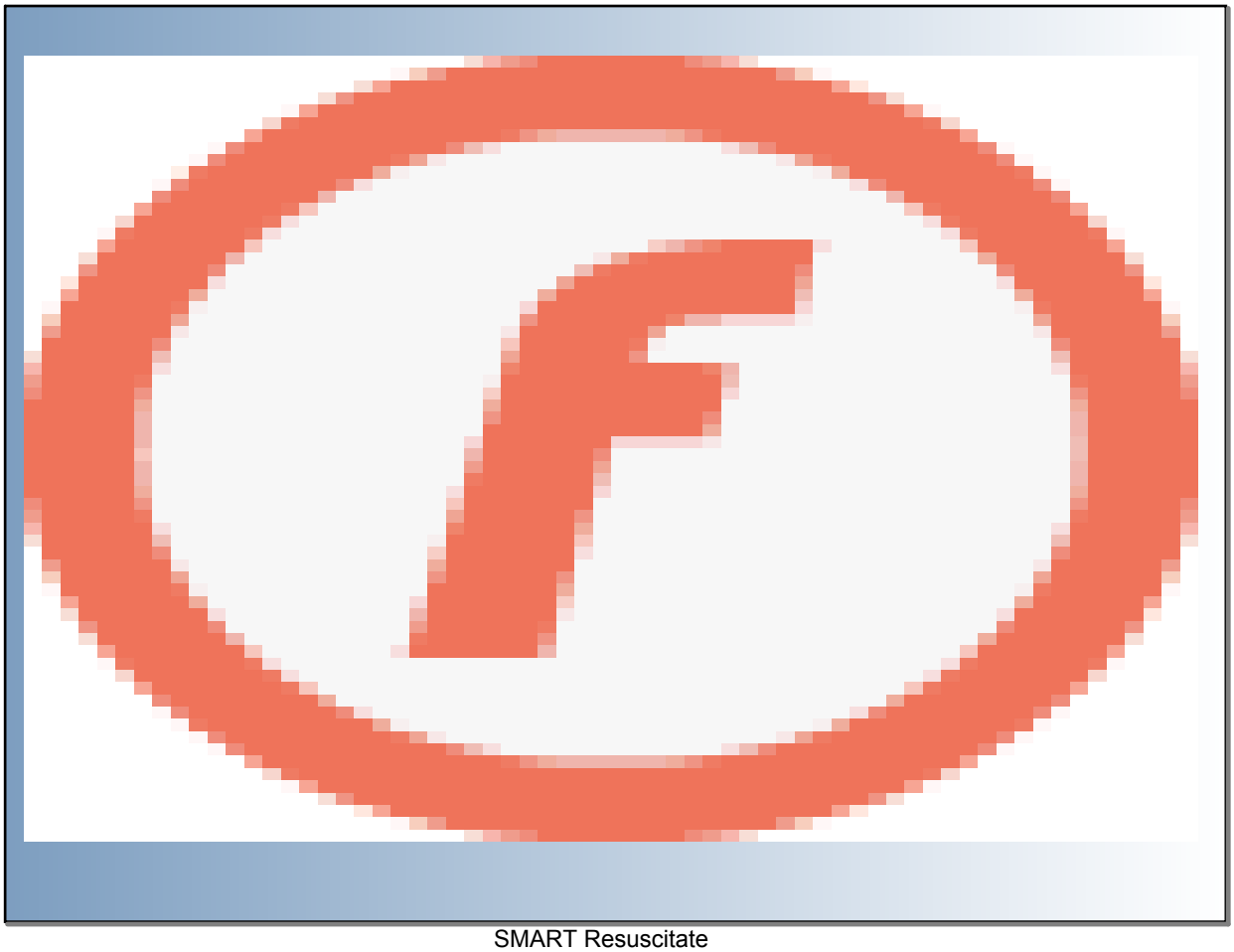


SMART Resuscitate

References

The Respiratory System Video

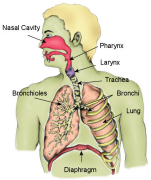
http://kidshealth.org/PageManager.jsp?lic=1&article_set=59300&cat_id=20607

The Human Respiratory System Video

http://www.sciencekids.co.nz/videos/humanbody/respiratorysystem.html

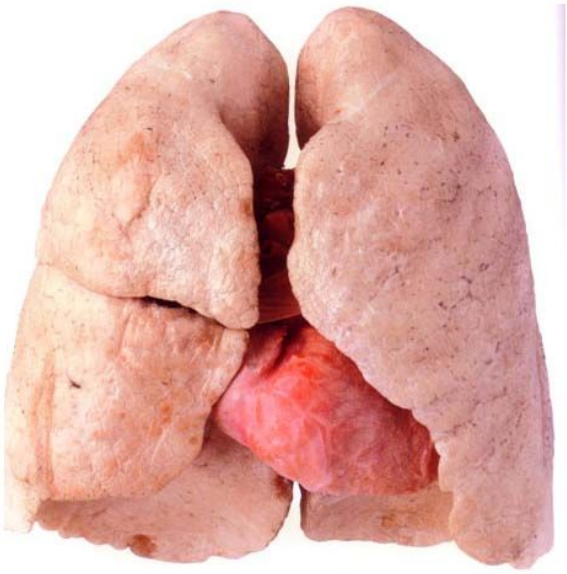
The Human Respiratory System Clip Art

http://www.teachpe.com/anatomy/respiratory_system.php



References

nonsmoker vs. smoker



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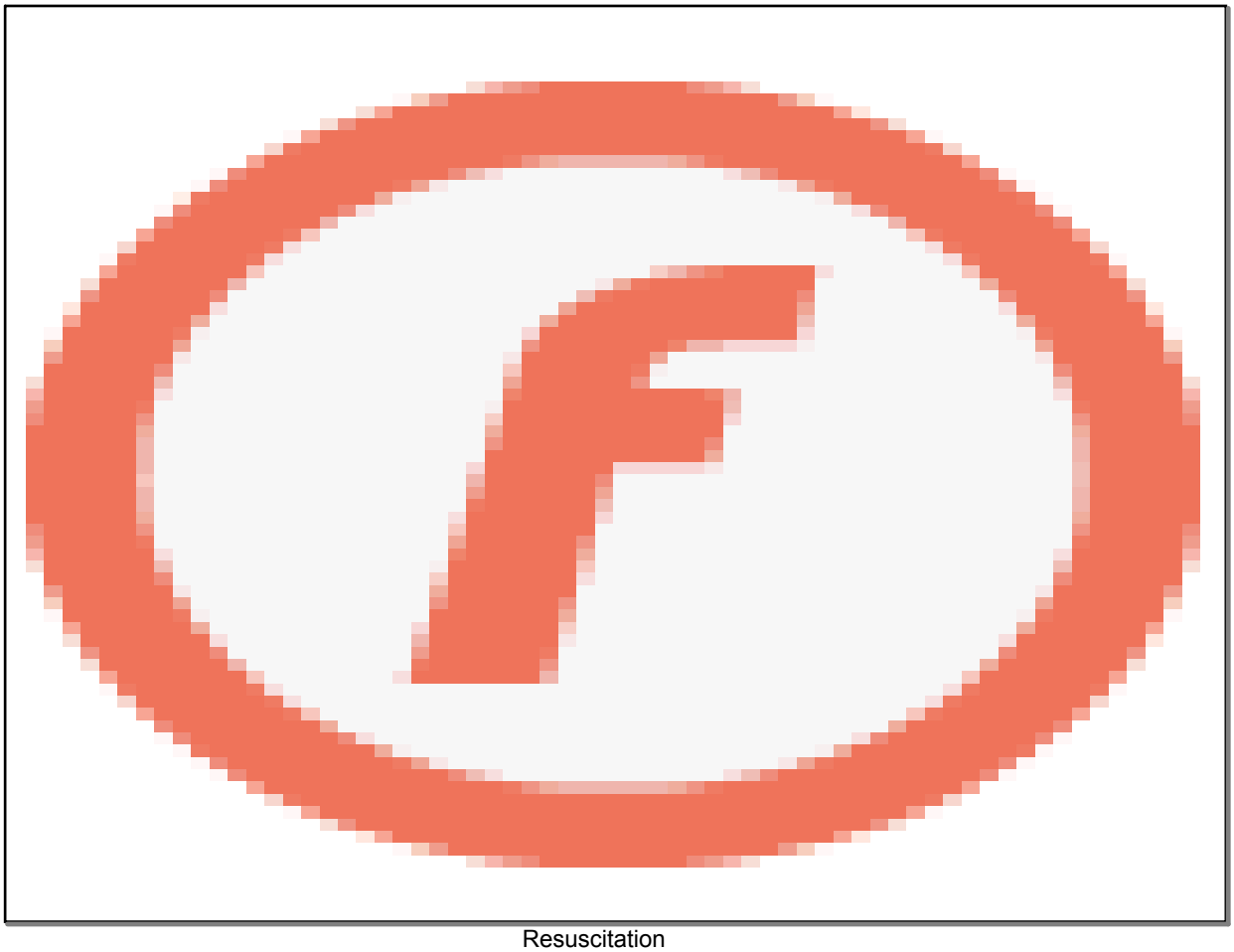
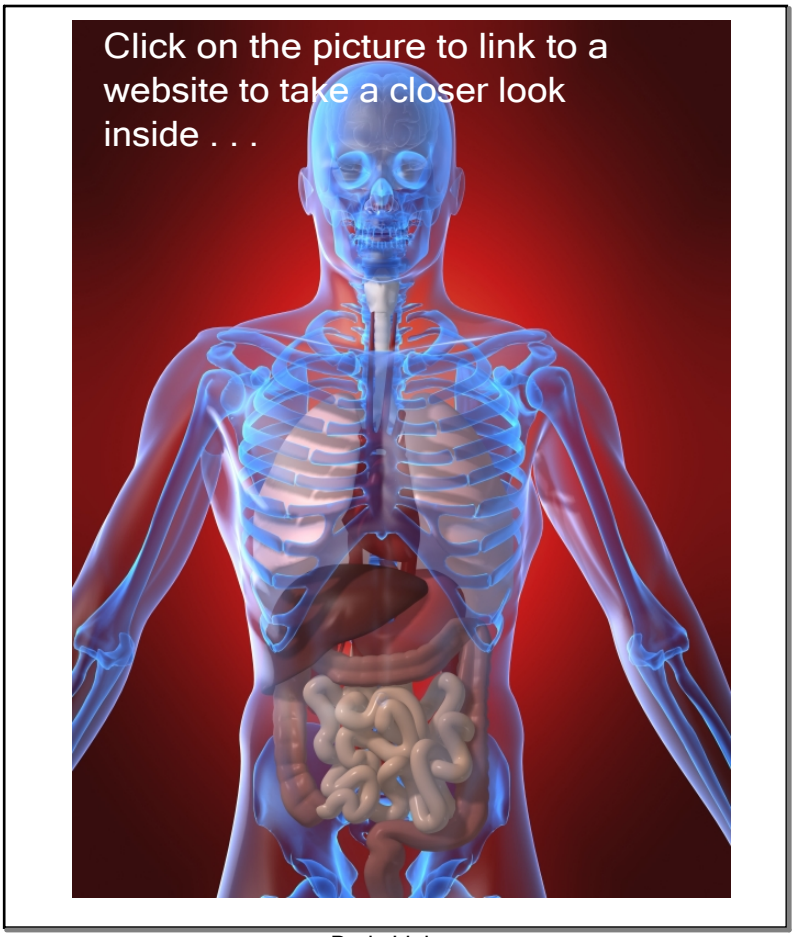


Resuscitation



Body Link

Biology 111

- Describe adaptive features that provide for efficient gas exchange in humans (116-7, 317-1)

Biology 111 Optional

- Predict the impact of environmental factors such as allergens on homeostasis within an organism.

Nov 21-7:51 PM